EXHIBIT 1

tire technology EXPO 2009

Now in its ninth year, Tire Technology Expo is Europe's most important tire design and manufacturing technology exhibition and conference with some 130 exhibiting companies.

Tire Technology Expo 2009 offers the visitor a technology showcase covering materials and equipment through the complete spectrum of the tire design and manufacturing process.

Tire Technology Expo 2009 also offers visitors, exhibitors, and conference delegates an unrivalled networking opportunity within the tire design and manufacturing sector.

HAMBURG MESSE, HAMBURG, GERMANY

The expo will be held in Hamburg Messe, Hamburg, Germany

TRAVEL DETAILS

AIR 20 minutes from Hamburg International Airport to the exhibition center by car. The Airport City bus takes you to the main railway station. Onward transport with S-rail or underground.

CAR A traffic guiding system installed on the Federal and State highways leads directly to the exhibition grounds, in the direction of the TV tower.

TRAIN Destination: Hamburg-Dammtor. Commuter trains: Dammtor station (S11, S21 and S31). Underground lines: U1 to Stephansplatz, U2 to Messehallen. City buses: 102, 109, 111 and 112. Fast city bus systems: 34, 35 and 36.

www.tiretechnology-expo.com

TIRE TECHNOLOGY EXPO 2009 PROGRAM

DAY 1 SESSION 1
TUESDAY 17 FEBRUARY 2009

TIRE TECHNOLOGY VERSUS INCREASING COSTS AND PERFORMANCE REGULATIONS

09.00 – 09.15 OPENING ADDRESS
Dieter Freitag, General Director, Michelin Germany
09.15 – 09.45 TPMS & LEGAL REQUIREMENTS – THEORY AND PRACTICE OF TESTABILITY
Joerg Sturmhoebel, Audi/Nira Dynamics and Victor Und erberg, Audi
09.45 – 10.15 THE FUTURE OF INDIRECTLY MEASURING TPMS
Bernd Schuchhardt, Dunlop-Tech
10.15 – 10.45 THE TREAD ACT - A LOOK BACK AND A LOOK FORWARD
Mike Wischhusen, Michelin North America
10.45 – 11.05 MORNING BREAK
11.05 – 11.35 HOW WILL THE NEW REGULATORY FRAMEWORK SHAPE THE TIRE MARKET FROM 2012
Mrs F Cinaralp, ETRMA
11.35 – 12.05 TIRE TECHNOLOGY TRENDS DRIVEN BY COST AND REGULATIONS
Christian Kötz, Continental
12.05 – 12.35 THE HISTORY OF THE RUN FLAT TIRES
Bernd Loewenhaupt, Goodyear Dunlop Tires Germany
12.35 – 13.05 CONTINENTAL TIRES AND TIRE ELECTRONICS TECHNOLOGY
Peter Saeger, Continental
13.05 – 14.05 LUNCH
14.05 – 14.30 INDUSTRY FOCUS ON ROLLING RESISTANCE: WHERE TO MAKE THE TRADE-OFFS?
Pim van der Jagt, Ford
14.30 – 15.00 TIRE ROLLING RESISTANCE REDUCTION BY NANOSTRUCTURE-ORIENTED PROPERTIES CONTROL TECHNOLOGY
Keizo Akutagawa, Bridgestone Technical Centre Europe
15.00 – 15.30 TIRE PASS-BY NOISE REDUCTION BY USING SLOT RESONATORS
Shu Fujiwara, Bridgestone Technical Centre Europe
15.30 – 16.00 UNIFORMITY - A CRUCIAL ATTRIBUTE OF TIRE/WHEEL ASSEMBLIES
Marion G Pottinger, M'Engineering
16.00 – 16.20 AFTERNOON BREAK
16.20 – 16.50 DEVELOPMENT OF A COMPOSITE WHEEL - THE LATEST ACHIEVEMENTS
Prof. Ulf Sandberg, VTI (Swedish National Road & Transport Research Inst)
16.50 – 17.20 CONTINUOUS MOBILITY – DEVELOPING A NON-PNEUMATIC TIRE (NPT) FOR 21ST CENTURY MILITARY VEHICLES
Michael Tercha and Ed Hall, Resilient Technologies

DAY 1 SESSION 2
TUESDAY 17 FEBRUARY 2009

MANUFACTURING TECHNOLOGIES

10.00 – 10.20 LASER MATERIAL PROCESSING IN THE TIRE INDUSTRY – APPLICATION OVERVIEW
Joerg Jetter, 4Jet Sales & Service
10.20 – 10.40 NEW PC APEXER FROM CONTI MACHINERY
František Pilný, Continental Matador Rubber
10.40 – 11.00 HIGH SPEED CALENDERLINES FOR TIRE INDUSTRIES. DEVELOPMENTS OF AUTOMATIC WINDING EQUIPMENT
Renato Lualdi, Comero Ercole
11.00 – 11.20 MAS400 - THE NEW COST-EFFECTIVE AND TAILOR-MADE SOLUTION FOR TIRE BARCODE READING PROCESS OFFERING HIGHEST READ RATES
Ralf Weisser, Datalogic Automation
11.20 – 11.40 TIRE CONTOUR MEASUREMENT BY SHEET OF LIGHT
Dr Oliver Scholz, Fraunhofer Institut für Integrierte Schaltungen
11.40 – 12.00 GABOTACK® - THE TACKINESS TESTER FOR THE TIRE INDUSTRY. DETERMINATION OF THE TACKINESS OF "GREEN TIRES"
Herbert Halm, GABO Qualimeter
12.00 – 14.00 LUNCH
14.00 – 14.20 NEW ROTOR TECHNOLOGY - ADVANCED ROTOR DESIGNS
Richard J Jorkasky II, Kobelco Stewart Bolling
14.20 – 14.40 STATISTICAL TOOLS IN AN ANALYTICAL LABORATORY – CHEMOMETRY
Dr Giansante Rugo, Pelmar Engineering Group
14.40 – 15.00 HIGH SPEED AND COST-EFFECTIVE SHEAROGRAPHY TIRE TESTING FOR PASSENGER, TRUCK, AVIATION AND OTR TIRES
Rainer Huber, Steinbichler Optotechnik
15.00 – 15.20 FAST SHEAROGRAPHY INSPECTION FOR NEW TIRE PRODUCTION
Roland Zehentmaier, Steinbichler Optotechnik
15.20 – 15.40 STRAINING AND HIGH PRESSURE EXTRUSION APPLICATIONS IN THE TIRE INDUSTRY
Winfried Trost, Uth
15.40 – 16.00 AFTERNOON BREAK
16.00 – 16.20 VMI MAXX: MAXIMUM PERFORMANCE IN SINGLE STAGE TIRE BUILDING
J K Grashuis, VMI
16.20 – 16.40 SPRING VENTS – NEW TECHNOLOGY
Michael Stefanidis, Glebus Alloys Europe
16.40 – 17.00 VISUAL INSPECTION OF TIRE; EVALUATION AND IMPROVEMENT
Mohammad Zendehrooh Kermani, Barez Industrial Group
17.00 – 17.20 APPLYING THE TIME SERIES IN ANTICIPATING THE DEFECTS IN TIRE INDUSTRY
Reza Farivar, Kavir Tire
17.20 – 17.40 TIRE MANUFACTURERS IMPROVE SAFETY WITHOUT COMPROMISING PRODUCTIVITY
James Neawedde, Rockwell Automation

DAY 1 SESSION 3
TUESDAY 17 FEBRUARY 2009

THE VIRTUAL TIRE: LEARNING MORE FROM TIRE PROPERTY PREDICTIONS

SESSION ORGANIZED BY DR MIKE BLUNDELL, COVENTRY UNIVERSITY

13.30 – 13.55 MODELING FOR OPTIMIZED WINTER TIRE PERFORMANCE.
Jerome Delu, Goodyear
13.55 – 14.20 CHALLENGE FOR AIRCRAFT TIRES

Dr Wei Ding, Dunlop Aircraft Tyres
14.20 – 14.45 TITLE TO BE CONFIRMED
Prof Dr Peter Lugner, University of Technology, Vienna
14.45 – 15.10 RMOD-K 7 AND MISUSE LOAD CASES
Prof. Dr Oertel, Brandenberg University
15.10 – 15.30 AFTERNOON BREAK
15.30 – 15.55 TITLE TO BE CONFIRMED
Dr Oluremi Olatunbosun, University of Birmingham
15.55 – 16.20 AIRCRAFT TIRE MODELLING
Gary Wood, Coventry University
16.20 – 16.45 TITLE TO BE CONFIRMED
Dr George Mavros, Loughborough University
16.45 – 17.10 INTERPLY SHEAR STRESS PREDICTION OF DIFFERENT BELTS STRUCTURE OF A PASSENGER CAR TIRE BY A DEVELOPED FEM
Ms Mahdieh Zamzamzadeh, Barez Industrial Group

CONTINUED ON DAY 2 SESSION 3

DAY 1 SESSION 4
TUESDAY 17 FEBRUARY 2009

GETTING INCREASED VALUE FROM TIRE COMPOUNDING ADDITIVES

SESSION ORGANIZED BY DR LOTHAR STEGER, CONSULTANT

13.30 – 13.55 RUBBER PROCESSING STARTS WITH MIXING: A REVIEW OF THE INDUSTRIAL SCALE MIXING PROCESS
Gerard Nijman, Vredestein Banden-Enschede
13.55 – 14.20 NEW PLASTICIZERS - NEW ANALYTICAL CHALLENGES
Jürgen Trimbach ,and Tobias Wagner, Hansen & Rosenthal
14.20 – 14.45 TIRE WET GRIP: AN INSIGHT
Massimo Cialone, Marangoni Group
14.45 – 15.10 NON CONVENTIONAL ACCELERATOR COMPOUNDING – A TOOL IN SILICA TECHNOLOGY?
Thomas Früh, Rhein Chemie-Mannheim
15.10 – 15.30 AFTERNOON BREAK
15.30 – 15.55 NEW FUNCTIONALISED SBRS TO MEET FUTURE TIRE PERFORMANCE DEMANDS
Norbert Steinhauser and Thomas Gross, Lanxess-PBR
15.55 – 16.20 IMPROVEMENT IN TIRE PERFORMANCE WITH NEW POLYMER-NANO-ADDITIVES
Lothar Steger, Consultant
16.20 – 16.45 PROCESSING BEHAVIOUR OF HIGH-CIS POLYBUTADIENES IN RUBBER COMPOUNDS HIGHLIGHTING NEODYMIUM POLYBUTADIENS
Heike Kloppenburg, Thomas Gross, Lanxess-PBR
16.45 – 17.10 APPLICATION OF SURFACE MODIFIED NANO ZINC OXIDE IN SULFUR VULCANIZATION OF TIRE TREAD COMPOUND
Ms Mercedeh Malekzadeh, Islamic Azad University & Rubber Industries Engineering and Research
15.55 – 16.20 IMPROVEMENT IN TIRE PERFORMANCE WITH NEW ORGANO-NANO ADDITIVES
Lothar Steger, consultant
16.20 – 16.45 PROCESSING BEHAVIOR OF HIGH-CIS POLYBUTADIENES IN RUBBER COMPOUNDS HIGHLIGHTING NEODYMIUM POLYBUTADIENS
Heike Kloppenburg, Thomas Gross, Lanxess-PBR
16.45 – 17.10 APPLICATION OF SURFACE-MODIFIED NANO ZINC OXIDE IN SULFUR VULCANIZATION OF TIRE TREAD COMPOUND
Dr Saeed Taghvaei and Mercedeh Malekzadeh, Islamic Izad University North Tehran Branch and Rubber Industries Engineering and Research Company (RIERCO)

DAY 2 SESSION 1
WEDNESDAY 18 FEBRUARY 2009

TIRE MATERIAL INNOVATIONS

09.00 – 09.25 A TIRE PERSPECTIVE OF OPPORTUNITIES & HSE ISSUES IN NANOMATERIALS: THE CASE OF ORGANCLAYS
Dr Luca Giannini, Pirelli Tyre Co
09.25 – 09.50 TIRE FILLERS: IS IT ALL JUST BLACK OR WHITE?
Dr Ali Ansarifar, Loughborough University
09.50 – 10.15 EXXCORE® DVA: AN INNOVATIVE NEW INNERLINER TECHNOLOGY
Robert N Webb, ExxonMobil Chemical
10.15 – 10.35 MORNING BREAK
10.35 – 11.00 PROCESSING OF NEW TIRE POLYMERS
Dr Dietmar Hoff, Rhein Chemie Rheinau
11.00 – 11.25 SULFRON 3001: LATEST FINDINGS TO SIGNIFICANTLY REDUCE ROLLING RESISTANCE FOR TIRES
Dr Rabin Datta, Teijin Aramid
11.25 – 11.50 EFFECT OF TALC ON ROLLING RESISTANCE IN TREAD COMPOUNDS
Dr Gilles Meli, Rio Tinto Minerals/Luzenac
11.50 – 13.30 LUNCH
13.30 – 13.55 TITLE TO BE CONFIRMED
Arnaud Favier, OldB-Metravib
13.55 – 14.20 IMPROVING ROLLING RESISTANCE AND WET GRIP – NEXT GENERATION SOLUTION SBRS
Dr Dieter Bellgardt, Dow Olefinverbund
14.20 – 14.45 ENERGY EFFICIENT TIRE COMPOUND PROCESSING
Colin Clarke, Schill & Seilacher
14.45 – 15.10 TITLE TO BE CONFIRMED
Dr Kamyar Alavi, Nynas
15.10 – 15.35 WET TRACTION – ONE CONCURRENT OF THE MAGIC TRIANGLE OF TIRES
Dr Michael Heinz, Evonik
15.35 – 15.55 AFTERNOON BREAK
15.55 – 16.20 THE EXAMPLES FOR APPLICATION OF TREATED MINERAL FILLERS IN SELECTED TIRE COMPOUNDS – A WAY TO COST REDUCTION.
Marek Gardavsky, Werba-Chem
16.20 – 16.45 HIGH PERFORMANCE SILICAS: A VERSATILE WAY TO IMPROVE HYSTERESIS/PERMEABILITY OF THE RUBBER COMPOUNDS
Dr Laurent Guy, Rhodia Silica
16.45 – 17.10 SILICONE RESINS IN RUBBER COMPOUNDING: CHARACTERISATION, PROCESSING AND PERFORMANCE IN TIRE TREAD FORMULATIONS
Manfred Gloeggler and Thomas Chaussee, Dow Corning
17.10 – 17.35 THE EFFECT OF CHAIN LENGTH AND SATURATION OF FATTY ACID AS AN ACTIVATOR IN RUBBER VULCANISATION WITH MERCAPTO ACCELERATOR ON ACTIVATION ENERGY AND CONSTANT RATE.
Mrs Sedigheh farsizadeh Zarandi and Ms MarziehRouhy, Kerman Tire & Rubber

TIRE TECHNOLOGY EXPO 2009 PROGRAM

DAY 2 SESSION 2
WEDNESDAY 18 FEBRUARY 2009

TIRE REGULATIONS: A FORCE FOR PROGRESS OR A FARCE?

09.00 – 09.25 PROPOSED EU TECHNICAL LEGISLATION ON TIRES
Ian Knowles, European Commission
09.25 – 09.50 RECENT TRENDS IN TIRE LEGISLATION REGARDING NOISE, ROLLING RESISTANCE AND WET GRIP
Dr Lars Schade and Urs Reichart, Federal Environmental Agency
09.50 – 10.15 REACH: HOW TO OPERATE EFFICIENTLY IN SIEFS AND CONSORTIA
Andrew Fasey The REACH Centre and Protection Through Knowledge (PTK) Ltd
10.15 – 10.40 IMPLEMENTATION OF REACH AT A MEDIUM SIZED COMPANY. NEXT STEPS AFTER PRE-REGISTATION
Dr Volker Börger, Schill & Seilacher
10.40 – 11.00 MORNING BREAK
11.00 – 11.25 REACH FROM TREE TO TIRE
Dr Steffen Erler, Smithers Rapra
11.25 – 11.50 REACH: A NEW ERA HAS STARTED END-DEC 2008?
L. Zullo, ETRMA
11.50 – 12.15
12.15 – 14.00 LUNCH
14.00 – 14.25 TIRE SAFETY AND REGULATORY ISSUES IN THE U.S.
Sean Kane, Safety Research & Strategies
14.25 – 14.50 REACH - SHOULD USERS OF CHEMICALS BE WORRIED?
Simon Brearley, The Reach Centre
14.50 – 15.15 NOISE, ROLLING RESISTANCE AND WET GRIP DATA AGAINST THE BACKGROUND OF AN UPDATE OF EUROPEAN REGULATION
Erik de Graaff, M+P
15.15 – 15.35 AFTERNOON BREAK
15.35 – 16.00 TITLE TO BE CONFIRMED
Prof. Ulf Sandberg, VTI (Swedish National Road & Transport Research Inst)
16.00 – 16.25 THE KYOTO PROTOCOL AND THE CARBON BLACK INDUSTRY
Gilles Moninot, Columbian Carbon Europa
16.25 – 16.50 IMPROVED REQUIREMENTS FOR APPROVAL OF ISO 10844 TEST SURFACES FOR NOISE CERTIFICATION OF TIRES AND VEHICLES
Dr Gijsjan van Blokland, M+P

DAY 2 SESSION 3
WEDNESDAY 18 FEBRUARY 2009

THE VIRTUAL TIRE: LEARNING MORE FROM TIRE PROPERTY PREDICTIONS (CONTINUED)

SESSION ORGANIZED BY DR MIKE BLUNDELL, COVENTRY UNIVERSITY

09.00 – 09.25 TRENDS IN DESIGN AND SIMULATION
Frans Peeters, Simulia Europe
09.25 – 09.50 DETERMINING EQUI-BIAXIAL FATIGUE PROPERTIES OF ELASTOMERS USING THE DYNAMET SYSTEM
Dr Steve Jerrams, Dublin Institute of Technology
09.50 – 10.15 VISCOELASTIC ANALYSIS OF ROLLING TIRES USING FINITE ELEMENT METHOD
Dr Mir Hamid Reza Ghoreishy, Iran Polymer Institute
10.15 – 10.35 MORNING BREAK
10.35 – 11.00 TIRE MODELLING : PREDICTION OF TEMPERATURE AND SPEED EFFECTS ON X-Y TIRE FORCES
Dr Pierre Fevrier, Michelin Technology Centre
11.00 – 11.25 TITLE TO BE CONFIRMED
Luke Bagnall, Airbus

DAY 2 SESSION 4
WEDNESDAY 18 FEBRUARY 2009

CORD ADVANCES

SESSION ORGANIZED BY DR RABIN DATTA, TEIJIN ARAMID BV

14.00 – 14.25 CARCASS MATERIAL – INFLUENCE ON TIRE PERFORMANCE
Kurt Uihlein, Cordenka CANCELLED
14.25 – 14.50 LYOCELL TIRE CORD FOR ULTRA HIGH-PERFORMANCE TIRES
Dr Soo Myung Choi, Hyosung Corporation
14.50 – 15.15 BRINGING INNOVATION TO THE TIRE TECHNOLOGY
Albert Galan Llonggueras, TwistTechnology
15.15 – 15.40 A REVOLUTIONARY NEW TYPE OF PET TIRE YARN FOR CARCASS APPLICATIONS
Bas Krins, Applied Polymer Innovations, Emmen
15.40 – 16.00 AFTERNOON BREAK
16.00 – 16.25 ADHESION ACTIVATION OF TWARON ARAMID FIBERS: CHEMICAL VERSUS PLASMA TREATMENT
Dr Pieter de Lange, and P G Akker, Teijin Aramid
16.25 – 16.50 SOME ASPECTS OF ADHESION OF ARAMID TIRE CORDS
Maarten van de Made, TFA Institute
16.50 – 17.15 STANDARD REQUIREMENTS AND FUTURE TRENDS
Dr Peter Zmolek, Continental

ADDITIONAL SPEAKERS TO BE ANNOUNCED

DAY 2 SESSION 5
WEDNESDAY 18 FEBRUARY 2009

THE TYROSAFE PROJECT

SESSION ORGANIZED BY STEVE PHILLIPS, SECRETARY GENERAL, THE NATIONAL HIGHWAY RESEARCH LABORATORIES OF EUROPE

09.00 – 09.15 AN INTRODUCTION TO THE TYROSAFE PROJECT
Manfred Haider, Tyrosafe/Arsenal Research
09.15 – 09.45 EUROPEAN POLICIES CONCERNING ROAD SURFACE CHARACTERISTICS
Roland Spielhofer, Tyreosafe/Arsenal Research
09.45 – 10.15 ROLLING RESISTANCE OF TWO PASSENGER CAR TIRES ON 40 DIFFERENT ROAD SURFACES
Gijsjan van Blokland, M+P

TIRE TECHNOLOGY EXPO 2009 PROGRAM

10.15 – 10.45 LESSONS LEARNED FROM PREVIOUS SKID RESISTANCE HARMONIZATION ATTEMPTS
Erik Vos, Tyrosafe/RWS
10.45 – 11.15 TO BE DECIDED
Fabienne Anfosso, Tyrosafe/LCPC
11.15 – 11.45 ROLLING RESISTANCE MEASUREMENTS
Jerzy Ejsmont, TU Gdansk
11.45 – 12.15 THE INTERACTION BETWEEN SURFACE TEXTURE AND TIRE TREAD DEPTH IN RELATION TO SKID RESISTANCE
Martin Greene, Tyrosafe/TRL
12.15 – 12.45 SUMMARY OF THE PRESENTATIONS
Manfred Haider, Tyrosafe/Arsenal Research

DAY 2 SESSION 6
WEDNESDAY 18 FEBRUARY 2009

UNDERSTANDING TIRE PROPERTIES

14.00 – 14.25 A TREADWEAR TEST PROCEDURE AND THE INFLUENCE WHICH THE SILICA COMPOUND EXERTS ON THE TIRE-TREAD WEAR
Shunichi Yamazaki, Intelligent Vehicle Research Institute
14.25 – 14.50 DYNAMIC BEHAVIOUR OF PRESTRAINED ELASTOMERS
Nutthanun Suphadon, University of London
14.50 – 15.15 FRICTIONAL SLIDING OF RUBBER
Philip Gabriel, University of London
15.15 – 15.40 CORRELATION BETWEEN PHYSICO-MECHANICAL PROPERTIES OF NR-BR BLENDS IN TIRE TREAD FORMULATION WITH THEIR THERMAL BEHAVIOUR
Mrs Fereshteh Motiee, and Dr Saeed Taghvaei-Ganjali, Islamic Azad University - North Tehran Branch
15.40 – 16.00 AFTERNOON BREAK
16.00 – 16.25 ROAD-EMBEDDED SYSTEMS FOR MEASURING STRESSES IN THE TIRE-ROAD CONTACT PATCH
Dr Gabriel Anghelache, University Politehnica of Bucharest
16.25 – 16.50 A LOCAL VIEW IN TIRE TRACTION MECHANISMS
Stefan Ripka, Institute of Dynamics and Vibration Research
16.50 – 17.15 FUNDAMENTALS OF RUBBER-ICE FRICTION
Dr Jane Blackford, University of Edinburgh
17.15 – 17.40 TITLE TO BE CONFIRMED
Stefan Dengler, SDS Systemtechnik

DAY 2 (PM) SESSION
WEDNESDAY 18 FEBRUARY 2009

4 X 4 ROAD AND OFF ROAD TIRES

SESSION ORGANISED BY DR JAMES BRIGHTON, CRANFIELD UNIVERSITY

SPEAKERS TO BE ANNOUNCED

DAY 3 SESSION 1
THURSDAY 19 FEBRUARY 2009

THE INTELLIGENT TIRES' ROLE IN VEHICLE ELECTRONIC SYSTEMS

SESSION ORGANIZED BY FEDERICO MANCOSU, PIRELLI PNEUMATICI

09.30 – 09.55 ADDITIONAL INFORMATION FOR VEHICLE DYNAMICS USING CYBER TIRE : AQUAPLANING
Massimo Brusarosco, Pirelli Tire
09.55 – 10.20 VEHICLE DYNAMICS, POSSIBLE IMPROVEMENTS USING TIRE DATA
Francesco Braghin, Politecnico di Milano
10.20 – 10.45 TIRE-ROAD CONTACT INFORMATION FOR ADVANCED DRIVER ASSISTANCE SYSTEMS
Ari Tuononen, Helsinki University of Technology
10.45 – 11.10 THE SELF-INFLATING TIRE
Maros Topoli, Coda Development
11.10 – 11.35 TITLE TO BE CONFIRMED
Dr Ray Lohr, Transense Technologies
11.35 – 12.00 TIRE-ROAD FRICTION ESTIMATION FOR APPLICATION IN CHASSIS CONTROL SYSTEMS AND ADVANCED DRIVER ASSISTANCE SYSTEMS
Marco Pesce, Centro Ricerche Fiat

DAY 3 SESSION 2
THURSDAY 19 FEBRUARY 2009

NATURAL RUBBER: THE EVOLVING POLYMER

SESSION ORGANIZED BY DR ANDREW TINKER, TARRC

09.00 – 09.25 SILICA IMPROVES NR BASED TRUCK-TREAD PERFORMANCE
Paul Brown, TARRC
09.25 – 09.50 ALKYLPHENOL-POLYSULFIDE GRAFTED EPDM IN BLENDS WITH NR/BR FOR OZONE-RESISTANT TIRE SIDEWALLS
Hong-mei Zhang, Teijin Aramid
09.50 – 10.15 NATURALLY BETTER PERFORMANCE - IMPROVED UNDERSTANDING OF RUBBER-FILLER INTERACTION
Stuart Cook, TARRC
10.15 – 10.35 MORNING BREAK
10.35 – 11.00 ENHANCED PASSENGER TIRE TREAD PERFORMANCE FROM SUSTAINABLE RESOURCES
Paul Brown, TARRC
11.00 – 11.25 DELINK DEVULCANISATION TECHNOLOGY - A NEW OPTION FOR SUSTAINABILITY IN THE TIRE INDUSTRY
Steve Nieto, Green Rubber Global
11.25 – 11.50 NR PRODUCTION IN THE FUTURE
Dr Abdul Aziz S A Kadir

DAY 3 SESSION 3
THURSDAY 19 FEBRUARY 2009

CONSEQUENCES FOR TIRES OF THEIR MORE COMPLEX LIFESTYLE AND LONGER LIFE POTENTIAL

SESSION ORGANIZED BY JOHN DORKEN, BTMA

CONSUMER REQUIREMENTS ON TIRE TECHNOLOGY AND PERFORMANCE
Dr Henry Görlitz, Bereich Untersuchungen Abt. Produkttests II
COUNTERACT BALANCING BEADS ELECTROSTATIC TIRE BALANCING
James LeBlanc, Counteract Balancing Beads
JUST HOW WORN ARE OUR TIRES? - THE NEED FOR TREAD DEPTH INFORMATION ON THE IN-SERVICE FLEET
Dr John C Bullas, Atkins Highways & Transportation

ADDITIONAL SPEAKERS TO BE ANNOUNCED

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More than 14 days and up to 30 days prior to the event – 50% refund/50% payment due.
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Substitutions can be made in writing up to seven days prior to the event.

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Harburg-Freudenberger Maschinenbau GmbH
Herbert Maschinenbau GmbH & Co
HIROTEK Inc
Hoffmann Maschinen-und Anlagenbau GmbH
IKS Klingelnberg GmbH
Ilmberger GmbH
Indspec Chemical BV
Intereuropean Srl
Intralox LLC Europe
Jo Vision
Karagostar
Kobelco Stewart Bolling Inc
Kom-Tron Systemtechnik
Konstrukta-Industry, AS
Kraussmaffei Berstorff GmbH
Kurschat GmbH
Lang GmbH & Co KG
LAP GmbH
Laser-Med GmbH
Leonhard Breitenbach GmbH
Marangoni Meccanica SpA
Matteuzzi Srl
McNeil + NRM Inc
MEZSERVIS spol Sro
Micro-Epsilon Messtechnik GmbH & Co KG
MicroPoise Measurement Systems
Mitsubishi International GmbH
MTS Systems Corporation
Muench Chemie International GmbH
Nakata Engineering Ltd
NDC Infrared Engineering Ltd
Necumer Product GmbH
Oerlikon Textile GmbH & Co KG
Parker Hannifin GmbH & Co KG
Pelmar Engineering Company GmbH
Pomini Rubber and Plastics Srl
Prodicon International Srl
RCD - Industria e Comercio Ltda
Rhodia Operations SAS
RJS Corporation
RMS Equipment Company
RMT Robotics Ltd
Rockwell Automation
Rodolfo Comerio Snc
Rubber Service Srl
Samson Machinery Inc
Schill + Seilacher Struktol
SDS Systemtechnik
Seichter GmbH
Sigmavision Ltd
Simulia
SNE Deshors Moulage
Standards Testing Labs
Steelastic
Steinbichler Optotechnik GmbH
Systraplan GmbH & Co KG
Texkimp Ltd
The Poling Group
Tien Sheng Iron Works Co Ltd
Tire Curing Bladders LLC
TIS GmbH & Co KG
Troester GmbH & Co KG
TS Plzen AS
UTH GmbH
Uzer Makina ve Kalip Sanayii AS
VMI EPE Holland BV
Werba-Chem GmbH
Wyko Tire Technology Ltd
Yxlon International X-Ray GmbH
Zeppelin Silos & Systems GmbH
ZF Friedrichshafen AG
Z-Laser Optoelektronik GmbH

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Tel: +44 (0)1306 743744 Fax: +44 (0)1306 877411 Email: m.fenner@ukintpress.com
Register online at: www.tiretechnology-expo.com

SELF INFLATING TIRE

simple...effective...convenient

SIT - the most simple and cost-effective self inflating tire system

February 2009

Hamburg

SELF INFLATING TIRE

AGENDA

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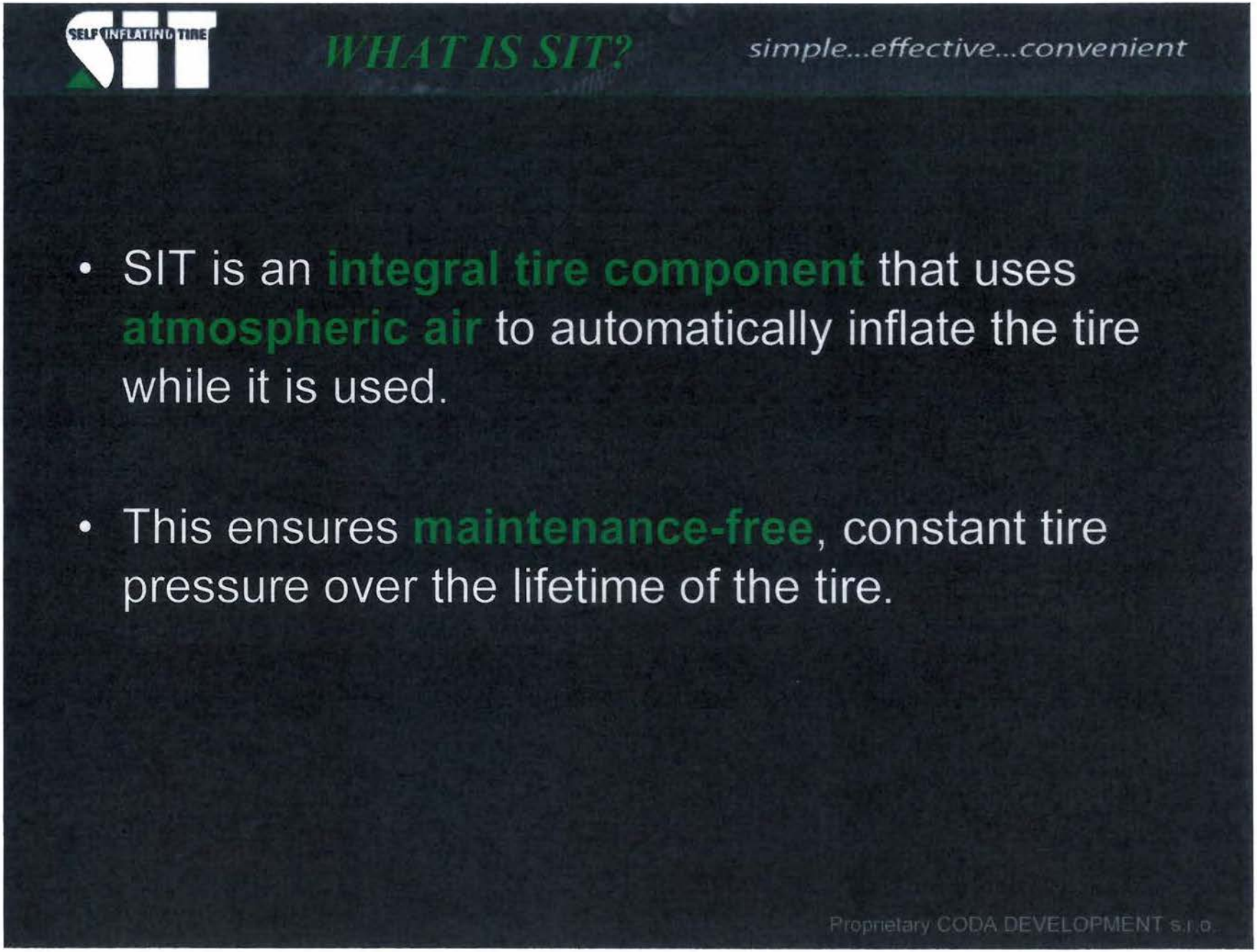
- What is SIT
- Key SIT benefits
- Current status of SIT development
- Next steps
- Wrap-up
- Technical session + Q&A


SELF INFLATING TIRE
SIT
WHAT IS SIT?
simple...effective...convenient
• SIT is an integral tire component that uses atmospheric air to automatically inflate the tire while it is used.
• This ensures maintenance-free, constant tire pressure over the lifetime of the tire.
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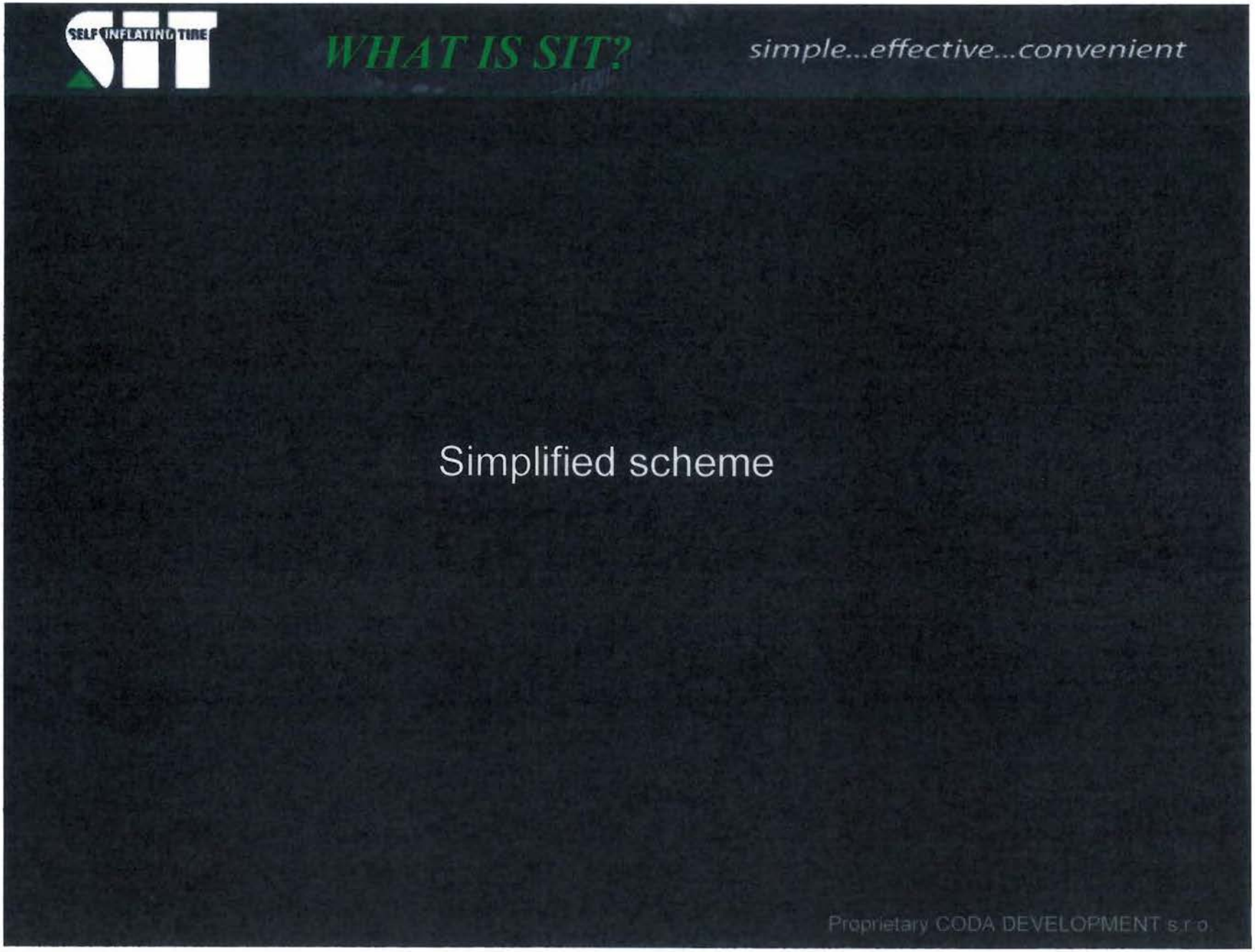
SELF INFLATING TIRE
SIT
WHAT IS SIT?
simple...effective...convenient
Simplified scheme
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SELF INFLATING TIRE SIT

WHAT IS SIT?

simple...effective...convenient

Key principles of SIT design:

- **SIMPLE**
  - *Tire-integrated feature uses the motion of the vehicle to re-inflate the tire with atmospheric air*
  - *Consists of only two key components*
    - Tire-integrated chamber with check valve – peristaltic pump
    - Pressure Management Device
- **COST EFFECTIVE**
  - *Expected easy integration into current manufacturing processes*
  - *With marginal extra production costs*

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CODA TEAM

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- CODA DEVELOPMENT introduced the SIT technology for the first time to the professional public at the SAE World-Congress in Detroit, April 2008.

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ACHIEVEMENT

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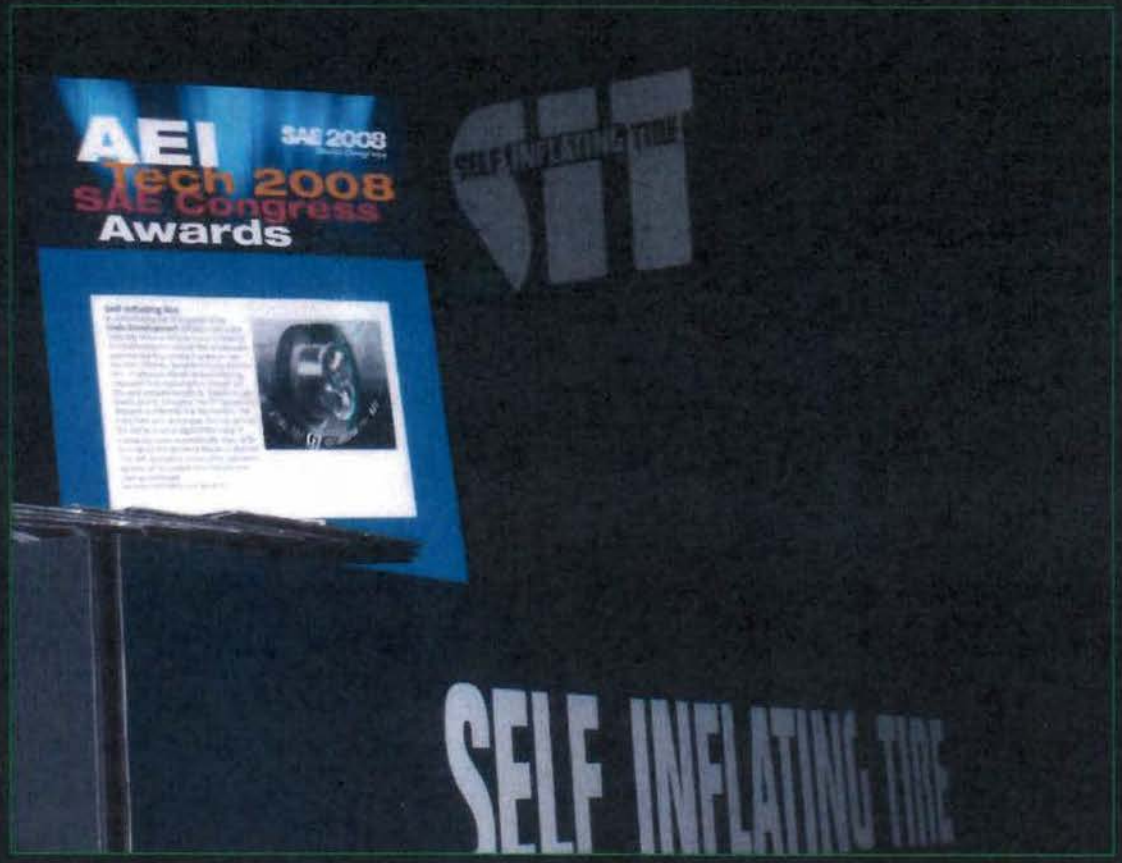
AWARDED AT SAE WORLD-CONGRESS



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SELF INFLATING TIRE
SIT
WHY SIT?
simple...effective...convenient
SIT answers key social concerns:
SAFETY
ECONOMY
ENVIRONMENT
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WHY SIT?

simple...effective...convenient

Under-inflated tires undermine:

- **SAFETY**
  - *660 lives and 33,000 injuries every year (USA, 2007)*
- **FUEL ECONOMY**
  - *Extra $2.7 billion in fuel annually in USA (1.24 billion gallons)*
  - *Extra €9.5 billion in fuel annually in EU (8.1 billion liters)*
- **ENVIRONMENT**
  - *Extra 18.4 million tons of CO2 (EU)*
  - *Extra 4.5 million tires replaced every year (USA)*

Sources: NHTSA study, Bridgestone "Think before you drive" campaign

SELF INFLATING TIRE

WHY SIT?

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- FACT: Tires commonly leak slowly and unnoticeably
  - In the USA, 27% of passenger cars and 32% of light trucks and SUVs have at least one tire under-pressured by more than 25%.
  - 38% of people in EU is driving their cars with under-inflated tires
- FACT: Drivers do not check their tires
  - Although 85% of drivers in the USA are concerned about maintaining proper tire pressure, 43% of them do not take an active role in it
- FACT: OEMs to reduce CO_2 emissions in EU
  - From 160g/km to 130g/km by 2012
  - Properly inflated tire saves 6.9g/km

Sources: NHTSA study Bridgestone 'Think before you drive' campaign

SELF INFLATING TIRE

WHY SIT?

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- **Obama's Call for Tire Inflation to Beat Gas Crunch:**
  - *"There are things you can do individually, though, to save energy. ... Making sure your tires are properly inflated - simple thing. But we could save all the oil that they're talking about getting off drilling."* **Barac Obama, Aug. 1 2008 speech in Springfield, Mo.**

- **Schwarzenegger Jumps On Obama 'Proper Tire Inflation' Bandwagon:**
  - *"You can reduce your fuel costs by more than 15%. And I am talking about simple things, like proper tire pressure, avoiding rapid starts and stops, and keeping your engine tuned."*

SELF INFLATING TIRE SIT

WHY SIT?

simple...effective...convenient

- GM Volt, Fisker Karma, Tesla, but today any other car too
  - *Driving range per battery and MPG is crucial*
- MERCEDES
  - *Intents to abandon petroleum from its product line by 2015*
- VW China
  - *To cut consumption and emmisions by 20% by 2010*
- TPMS
  - *TREAD Act USA already mandates TPMS*
  - *TPMS in EU expected in 2012 and to include Low Rolling Resistance Tires too*

SELF INFLATING TIRE

WHY SIT?

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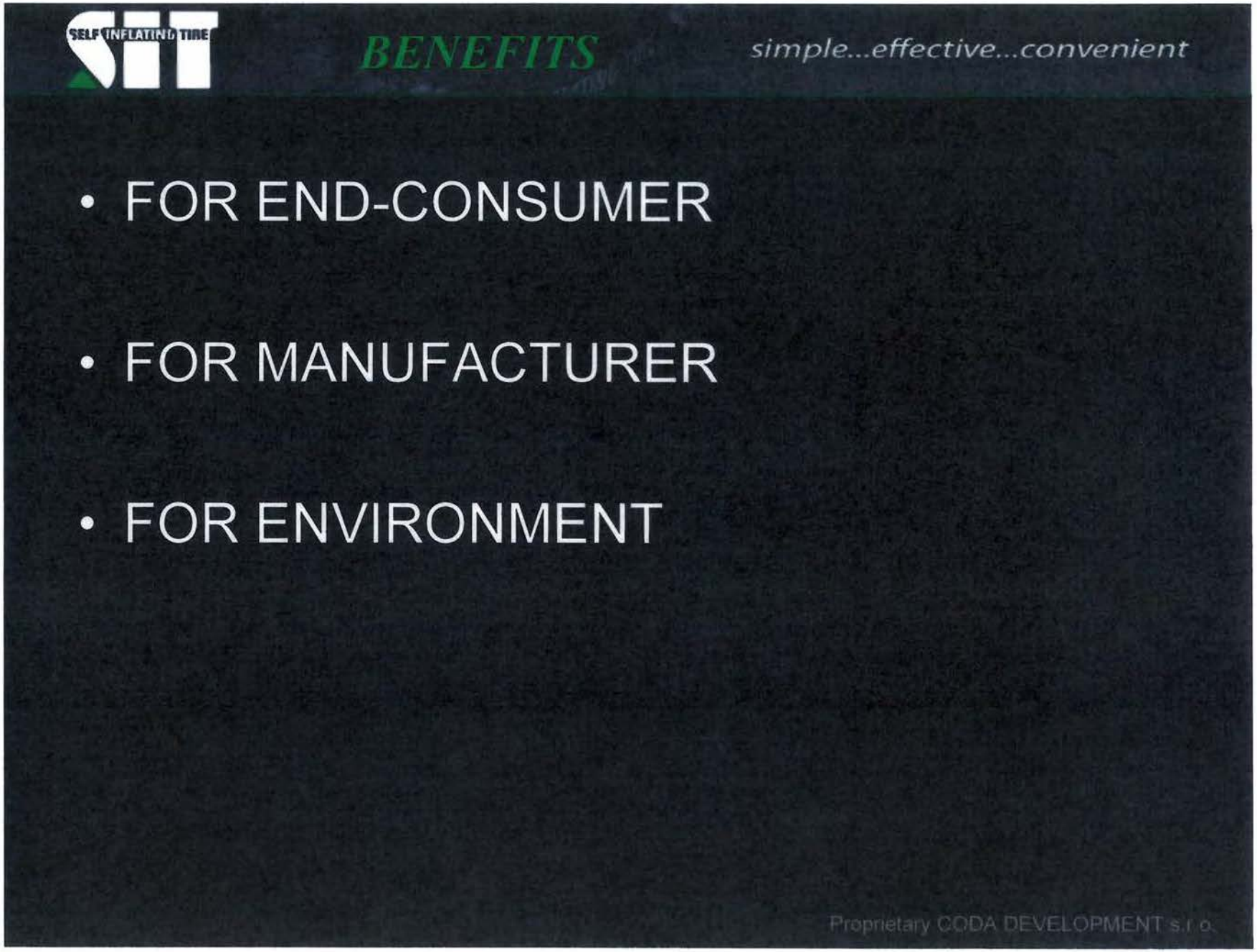
- There is a need for a product like SIT
  - There is existing market demand
  - There is a strong push from policy makers
  - There is an overall industry trend in line with SIT


SELF INFLATING TIRE
BENEFITS
simple...effective...convenient
• FOR END-CONSUMER
• FOR MANUFACTURER
• FOR ENVIRONMENT
Proprietary CODA DEVELOPMENT s.r.o.

SELF INFLATING TIRE

BENEFITS

simple...effective...convenient

- FOR END-CONSUMER

SELF INFLATING TIRE

BENEFITS

simple...effective...convenient

For end-users:

- **SAFETY**
  - Optimal car stability, reduced danger of blowouts, proper braking distance
  - 660 lives lost and 33.000 injuries related to under inflation (USA)

- **CONVENIENCE**
  - Drivers have confidence in knowing that their tires always operate at optimal pressure.
  - Eliminates inflating tires at gas stations
  - Reduces replacement of flats at highway roadsides

SELF INFLATING TIRE

BENEFITS

simple...effective...convenient

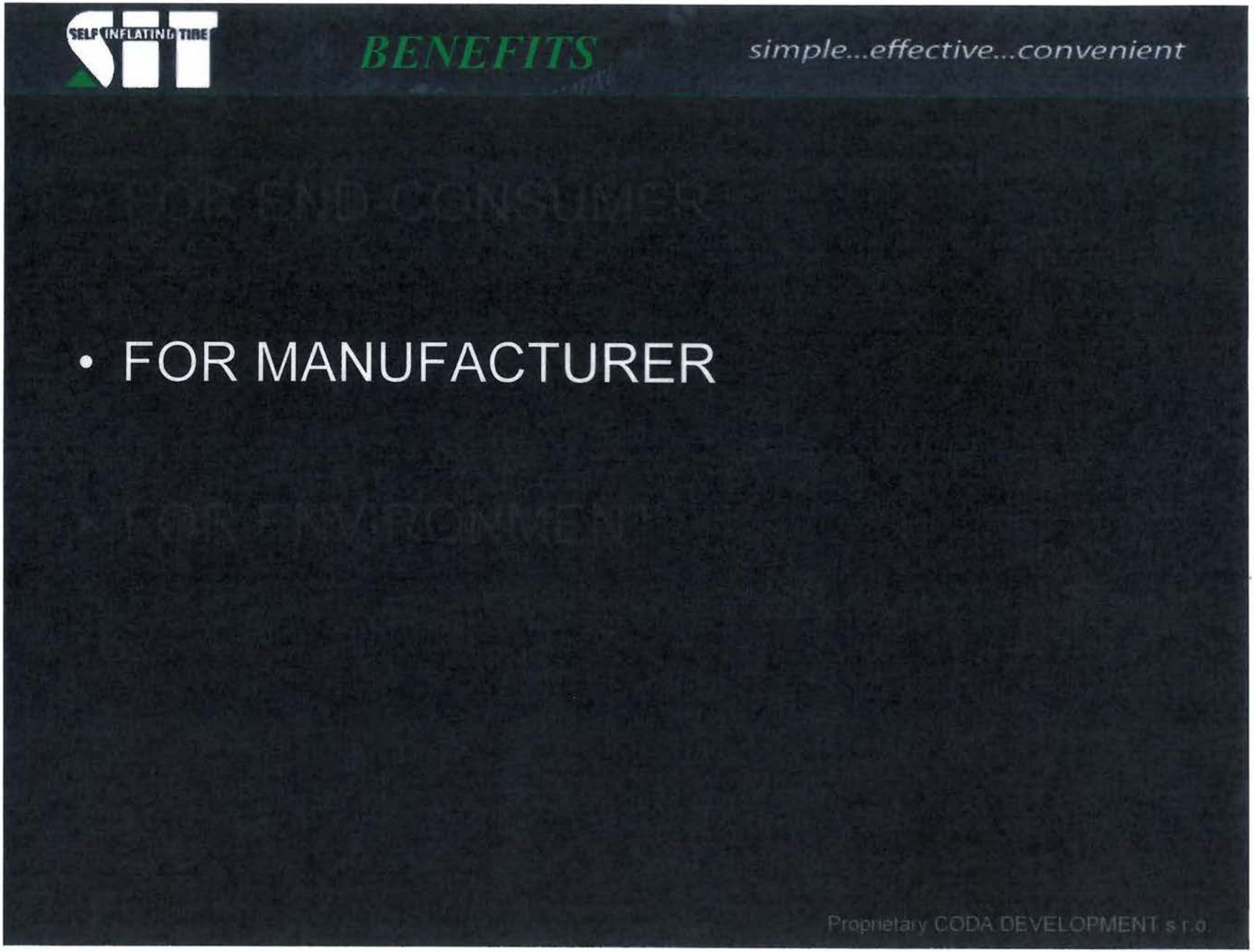
For end-users:

- **TIRE LONGEVITY**
  - In US extra 4.5 million tires replaced each year due to under inflation

- **FUEL ECONOMY**
  - Savings in fuel consumption in range of 1.5 – 3%.
  - In US 2.7 bn. USD and 1.25 bn. gallons p.a.

"Running a tire 20 percent under inflated - only 5 to 7 pounds per square inch (psi) - can increase fuel consumption by 10 percent." (Good Year)

Under inflation	Wear increase	Fuel use increase
10%	5%	2%
20%	16%	4%
30%	33%	6%


SELF INFLATING TIRE
BENEFITS
simple...effective...convenient
• FOR MANUFACTURER
Proprietary CODA DEVELOPMENT s r.o.

SELF INFLATING TIRE

BENEFITS

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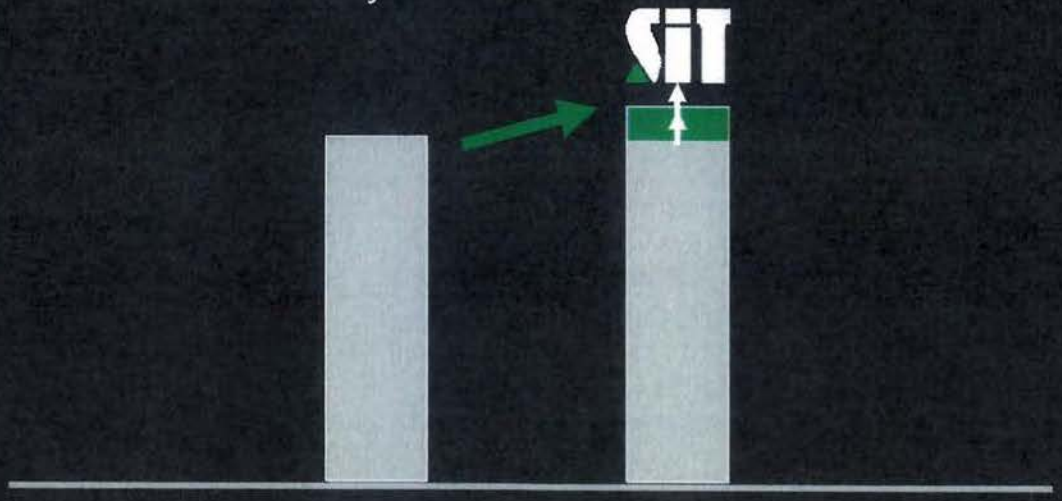
For manufacturer:

- **INCREASE OF PROFIT MARGIN**
  - SIT will increase tire production costs only marginally, thus increase of sale price will add directly to the profit margin
  - Favorable price premium due to expensive competitive products with lower functionality



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BENEFITS

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For manufacturer:

- **MARKET SHARE GROWTH**
  - First launcher competitive advantage
    - "owning" a new market segment
  - Difficult for followers to catch-up
  - Door opener to CAR MANUFACTURERS
  - Increased penetration to weak markets

SELF INFLATING TIRE SIT

BENEFITS

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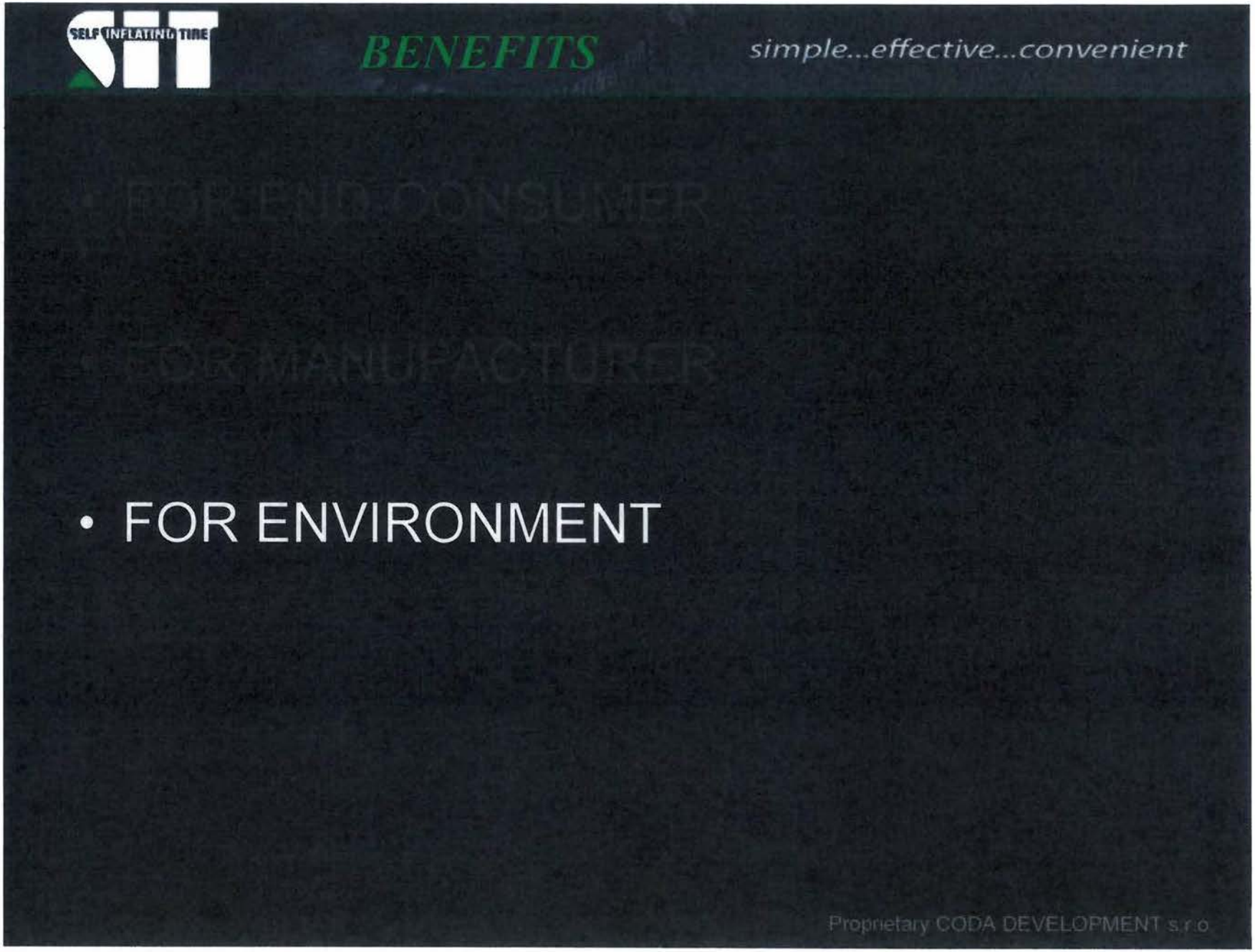
For manufacturer:

- **BRAND IMAGE**

  - SIT can enhance the brand image of associated manufacturer
  - Improved perception of an industry innovator with focus on safety and environment



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BENEFITS

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For environment:

- **LESS CARBON DIOXIDE EMISSIONS**
  - *Extra 18.4 million tons of CO2 (EU)*
- **FEWER SCRAP TIRES**
  - *Extra 4.5 million tires replaced every year (USA)*
- **LESS TIRE DEBRIS**
- **MORE EFFECTIVE RAW MATERIAL USE**

Source: NHTSA study, Bridgestone "Think before you drive" campaign

SELF INFLATING TIRE

BENEFITS

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SIT vs. competing products:

- SIT provides additional benefits over any of the currently available competitive products
- Improvements in tire related technologies create false feeling in users that they have „carefree“ tires resulting in decreased tire care behavior
  - SIT is a “carefree” tire

SELF INFLATING TIRE

STATUS

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- Coda Development s.r.o. owns patent rights related to the SIT technology
- Coda Development has developed and tested a conceptual prototype proving the functionality of the SIT system
- The next milestone is to conclude the R&D process and create a road ready pre-production prototype to undergo necessary on-road testing

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OBJECTIVES

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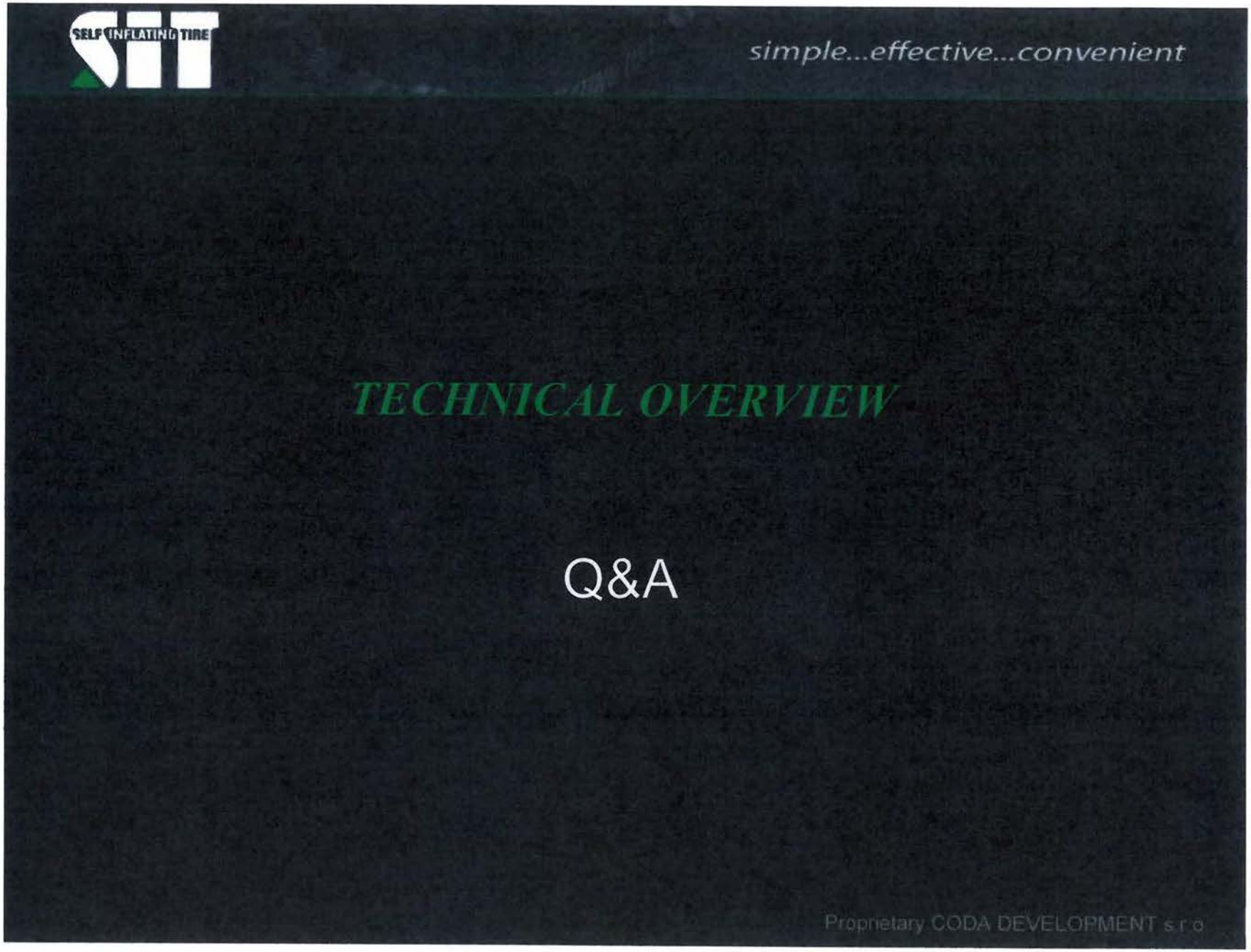
- **Identify suitable partner with capability to manufacture SIT tires**

- Finalize R&D
- Conduct on-road testing
- Launch SIT to worldwide markets



SELF INFLATING TIRE

DESIGN

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- SIT Principle - Peristaltic pump
- Internal circulation
- Pressure Management Device
- Tubing
- Other (filter, material...)

SELF INFLATING TIRE

DESIGN

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- INTERNAL CIRCULATION

  - Works only 1/3000cycles i.e. 15 km out of 50 000 km to eliminate statistical leakage

  - Decreases material stress and eliminates wear

SELF INFLATING TIRE

DESIGN

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INTERNAL CIRCULATION

Fig 5.

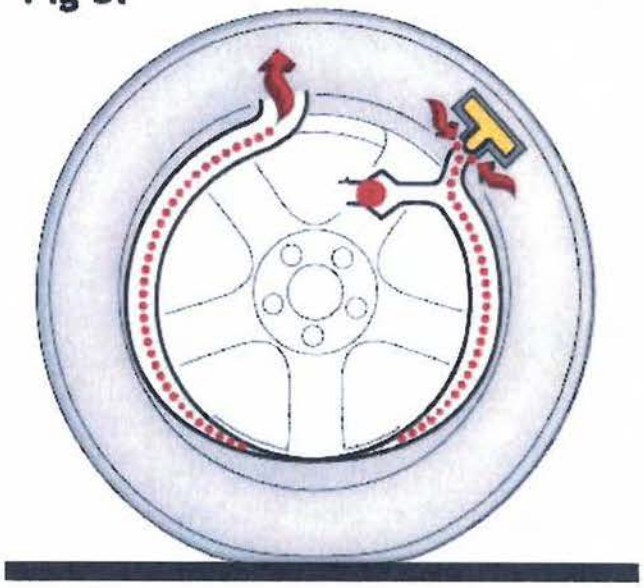
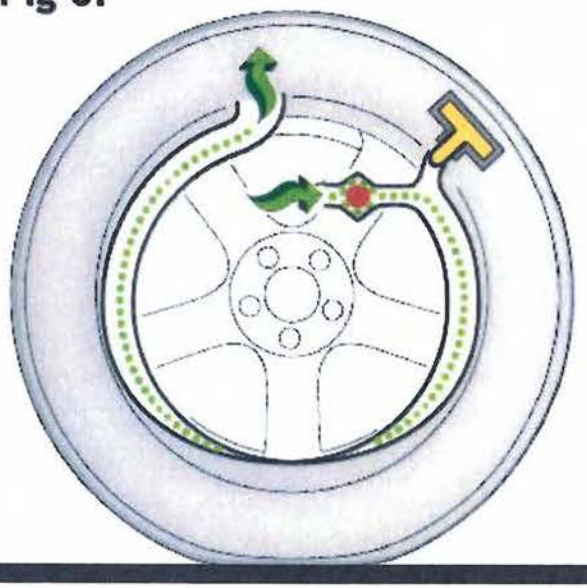


Fig 6.



SELF INFLATING TIRE

SIT

DESIGN

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PRESSURE MANAGEMENT DEVICE (PMD)

- Empty box with membrane
- Reflects temperature changes
- Enables pressure changes
- Can be replaced or supplement with spring
- Can be replaced with electronic valve/utilizing TPMS
- SIT to behave like normal tire when not functioning

SELF INFLATING TIRE

DESIGN

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TUBE CHAMBER

- Part of the tire, rim or in-between
- Created as part of tire side wall or tire wall contains only „seat“ for separated tubing
- Short vs. long (almost around whole perimeter)
- Utilizing empty space

SELF INFLATING TIRE

DESIGN

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TUBE CHAMBER

Figure 1.

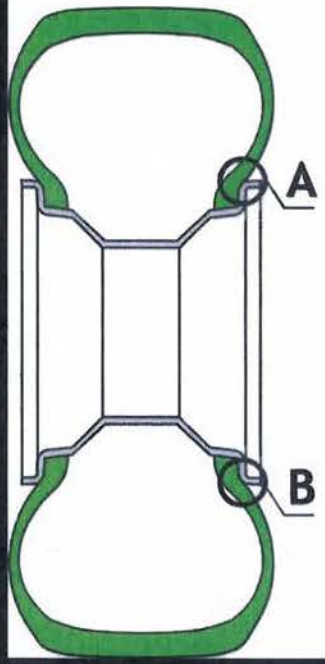


Figure 2.

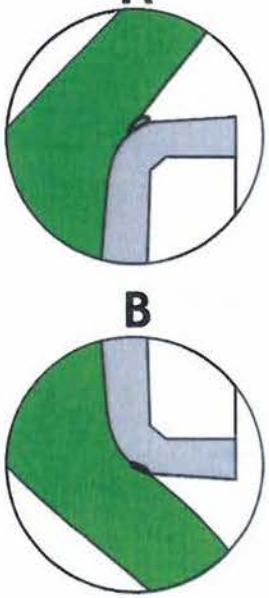
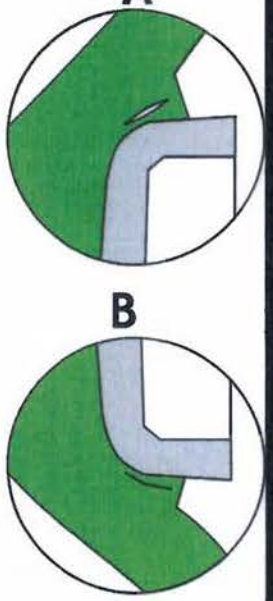


Figure 3.



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DESIGN

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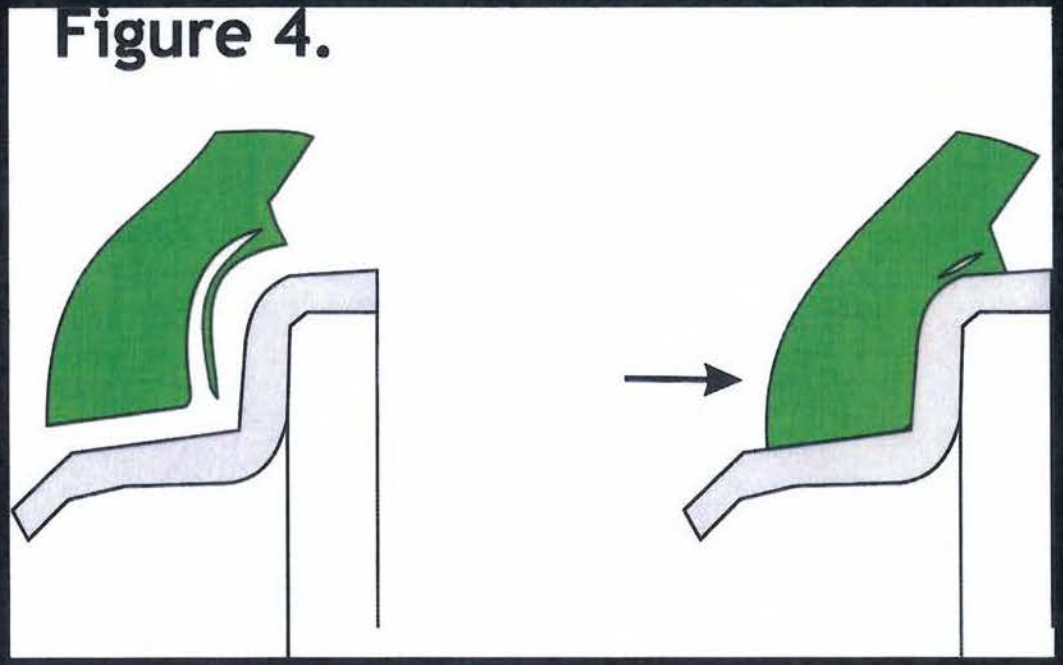
- TUBE CHAMBER

Figure 4.



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DESIGN

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- TUBE CHAMBER

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DESIGN

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- TUBE CHAMBER

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SELF INFLATING TIRE

DESIGN

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TUBE CHAMBER

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SIT
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Proprietary CODA DEVELOPMENT s r o

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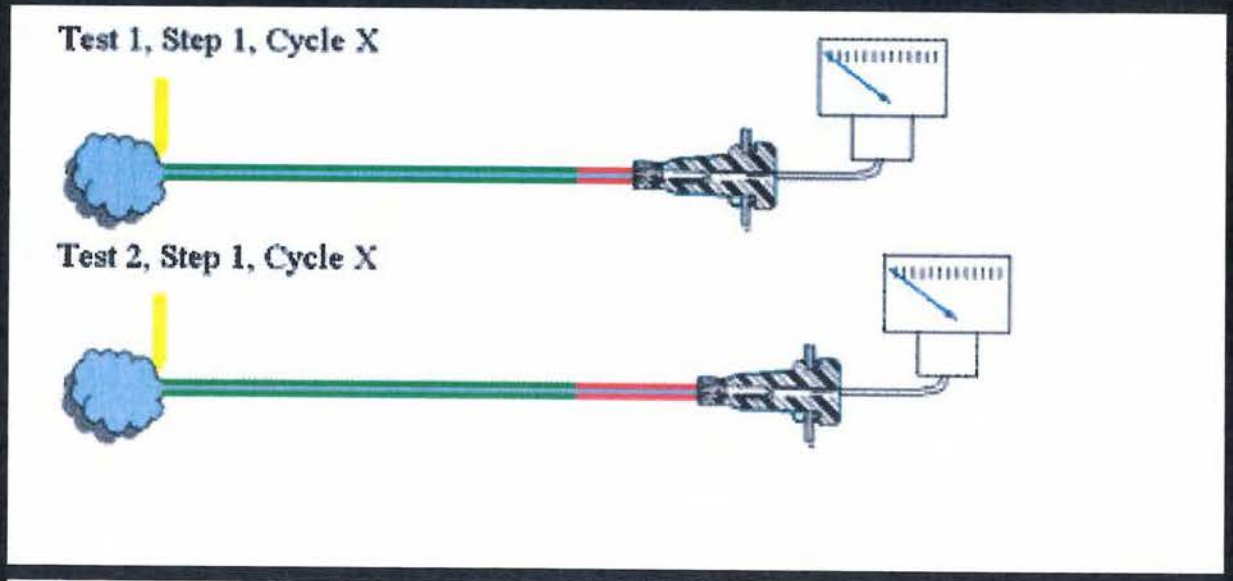

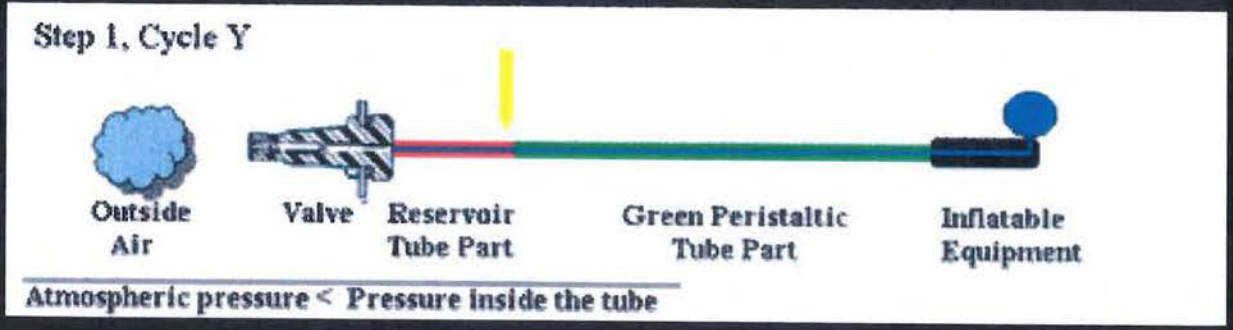

SELF INFLATING TIRE

HOW IT WORKS?

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- The SIT System is based on proven, highly *reliable peristaltic pump principles.* It integrates a tube chamber into the tire wall.

- The *tube chamber is kept closed at its lowest point* by the normal tire deformation caused by the weight of the vehicle.

- As the tire turns against the road this closure moves along the tube chamber, *forcing more air into the tire with each wheel revolution.* Simultaneously, it pulls outside air back into the chamber from the other side.

SELF INFLATING TIRE

HOW IT WORKS?

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- The chamber continuously pushes air into the tire *until it reaches its optimal pressure.* Then, a managing valve stops the intake of outside air and allows for inside circulation between the tire and the tube chamber, back and forth.

- Once the tire pressure falls below its optimal level, *the managing valve* disables internal air circulation and *opens the intake of atmospheric air* to activate the inflation again.

- As a result, this simple solution ensures that *all tires operate at optimal pressure at all times.*

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SELF INFLATING TIRE

TEST RESULTS

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- Between regular tires and rims *there is sufficient pressure* to enable tire inflation.
- The inflation capability *does not depend on the speed* of the vehicle.
- The *tube chamber* between the rim and the tire wall *is easy to produce* with marginal extra production costs.






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